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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/821,430

04/09/2004

Robert E. Cypher

5181-95901

1241

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7590

04/30/2007

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EXAMINER

THOMAS, SHANE M

ART UNIT

PAPER NUMBER

2186

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/30/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/821,430

Applicant(s)

CYPHER, ROBERT E.

Examiner

Shane M. Thomas

Art Unit

2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 11, 12, 14, 17-22, 27, 28 and 30 is/are rejected.
- 7) ☒ Claim(s) 7-10, 13, 15, 16, 23-26, 29, 31 and 32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

This Office action is responsive to the arguments filed 2/12/2007. Claims 1-32 remain pending.

The Examiner has cited the prior art reference of Moshovos et al. (*JETTY: Filtering Snoops for Reduced Energy Consumption in SMP Servers*) and applied two new grounds of rejection to the claims. As such, this action has been made Non-Final.

All previously outstanding objections and rejections to the Applicant's disclosure and claims not contained in this Action have been respectfully withdrawn by the Examiner hereto.

Response to Arguments

Applicant's arguments, see pages 2-5 of the current response with respect to the rejection(s) of claim(s) 1-5, 14, 17-21, and 30 under 35 U.S.C. §103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection under §102(b) is made in view of Moshovos et al. and additionally, a Double Patenting rejection has been additionally been raised.

Claim Objections

Claims 11 and 27 are objected to because of the following informalities: a period is required at the end of both claims. Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4 and 9-12 of United States Patent number 7,117,312 contain every element of claims 1-5 and 17-21 of the instant application and as such anticipate claims 1-5 and 17-21 of the instant application.

“A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or **anticipated by**, the earlier claim. *In re Longi*, 759 F.2d at 896, 225 USPQ at 651 (affirming a holding of obviousness-type double patenting because the claims at issue were obvious over claims in four prior art patents); *In re Berg*, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of obviousness-type double patenting where a patent application claim to a genus is anticipated by a patent claim to a species within that genus). “ *ELI LILLY AND COMPANY v BARR LABORATORIES, INC.*, United States Court of Appeals for the Federal Circuit, ON PETITION FOR REHEARING EN BANC (DECIDED: May 30, 2001).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6,11,12,14,17-22,27,28, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Moshovos et al. (*JETTY: Filtering Snoops for Reduced Energy Consumption in SMP Servers*).

As per claims 1 and 17, Moshovos teaches:

a storage (arrays - see figure 3(b) - page 89) **including a plurality of entries** (each array shown as comprising 256 entries) **configured to store corresponding snoop filter indications** (p-bit indications are being considered by the Examiner to be --snoop filter indications--. See column 2, paragraph 1, of page 89);

and a cache controller (element of the caching system shown in figure 1(b) that executes the logic responsible for performing snoops and queries into the JETTY storage - page 85, column 2, paragraph 1) **configured to receive a transaction** (page 86, column 1, paragraph 1) **request including an address** (physical address - figure 3(b)) **and to generate an index** (the result of the hash function for accessing the single p-bit array - see footnote 3 - page 89, column 2) **for accessing said storage by performing a hash function on said address** (Moshovos teaches that instead of using four separate indexes into a JETTY storage structure shown in figure 3(b), a hash function could have been used instead - footnote 3, page 89, column 2);

wherein, said cache controller is further configured to selectively generate a snoop operation) to said cache memory for said transaction request dependent upon a snoop filter indication (e.g. the corresponding p-bit of the single p-bit array) stored in said storage (single p-bit array) that corresponds to said address (page 89, column 2, paragraph 2 - p-bit must be non-zero in order to indicate that the snoop should be allowed to perform a tag lookup).

As per claims 2 and 18, Moshovos teaches wherein said cache controller is configured to generate said snoop operation to said cache memory for said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address was stored within said cache memory (a non-zero indication in the of the p-bit array indicates that the cache line corresponding to the address may be in the cache. Thus the p-bits indicate a superset of the entries of the cache - page 89, column 1, paragraph 4).

As per claims 3 and 19, Moshovos teaches wherein said cache controller is configured to ignore said transaction request if said snoop filter indication is a value indicative that a cache line corresponding to said address is not stored within said cache memory (if the p-bit corresponding to the respective entry in the p-bit array is logically zero, then the cache does not contain the cache line corresponding to the address - page 89, column 2, paragraph 2).

As per claims 4 and 20, Moshovos teaches wherein during a first mode of operation (e.g. using only an include-Jetty (page 89, section 3.2) and in response to a cache memory access (e.g. a write access), said cache controller is configured to store said snoop filter indication in an entry of said storage having an index equal to the hash value of an address associated with said cache line (allocation and the setting of the corresponding p-bit occurs as

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taught on page 89, column 2, paragraph 3). Further, as previously stated, a single p-bit array for use with a hashing algorithm and the physical addresses is taught in the footnote on page 89.

As per claims 5 and 21, Moshovos teaches **a second storage** (tag vector array of figure 3(a) - which can be included in conjunction with the first storage of figure 3(b) in a hybrid-Jetty snoop filter - page 90, section 3.3) **including a second plurality of entries configured to store second snoop filter indications** (present vector entries as shown in figure 3(a) and discussed on page 89, column 1, paragraph 1).

As per claims 6 and 22, Moshovos teaches **wherein during a second mode of operation** (e.g, the mode comprising a hybrid-Jetty snoop filter), **said cache controller is further configured to selectively generate a snoop operation to said cache memory for said transaction request dependent upon a second snoop filter indication** (present vectors) **stored in said second storage that corresponds to said address** (specifically the TAG address of the incoming physical address). In the hybrid-Jetty approach, if either of the exclude-Jetty or the Include-Jetty snoop filter indications for the respective cache line indicate that no match is possible, then the snoop request is not allowed to access the cache tags (page 90, column 2, paragraph 1); thus, the operation of selectively generating a snoop operation to the cache memory is dependent upon the second snoop filter indication in the second storage (the storage corresponding to the Exclude-Jetty filter).

As per claims 11 and 27, Moshovos teaches **during said second mode of operation** (e.g. the hybrid-Jetty), **generating a snoop operation to said cache memory for said transaction request if said given second snoop filter indication** (exclude-Jetty snoop filter) **is a value** (a present bit not being set - page 89, column 1, paragraph 2) **indicative that a cache line**

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corresponding to said address was stored within said cache memory (if the present bit for the corresponding entry within the exclude-Jetty is set, then the corresponding address is not contained within the cache; therefore, the entry may be in the cache when the present bit is not set).

As per claims 12 and 28, **wherein said cache controller is configured to ignore said transaction request if said given second snoop filter indication is a value indicative that a cache line corresponding to said address is not stored within said cache memory** (the snoop is ignored when the corresponding value bit is set, which indicates that the memory address of the snoop request is not contained within in the cache - page 89, column 1, paragraph 3).

As per claims 14 and 30, Moshovos teaches **wherein said cache memory includes a plurality of portions** (e.g. index entries, which are well known in the art of caching to contain data or tag information for the cache) **and each portion of said cache memory corresponds to a respective portion of said plurality of entries of said storage** (each physical address is mapped to one cache index (portion) as well as to a single p-bit - page 89, footnote 3).

Allowable Subject Matter

Claims 7-10,13,15,16,23-26,29,31, and 32, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As per claims 7 and 23, the prior art of record does not specifically teach, either alone or in combination, **wherein during said first mode of operation, said cache controller is further**

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configured to populate given entries of said second storage with said second snoop filter indications based on entries contained in said cache memory, as the Examiner has considered the --first mode-- to only incorporate the Include-Jetty of Moshovos while the second mode includes both the exclude-Jetty and the include-Jetty (hybrid-Jetty). Therefore, when using an include-Jetty (first mode), Moshovos would not populate second storage (which corresponds to the snoop filter of the exclude-Jetty of the second mode) based on entries of the cache memory.

As per claims 15 and 31, the prior art of record does not specifically teach **generating a snoop operation to a given one of said portions of said cache memory if said corresponding respective portion of said plurality of entries of said storage is populated with a predetermined number of said snoop filter indications**. Specifically, Moshovos generates snoop operations based on an indication of a present-bit within a snoop-filter and is silent with regard to issuing a snoop to the cache based on an entry being populated with a predetermined number of snoop filter indications.

Claims 8-10,13,16,24-26,29, and 32 are allowable over the prior art of record as being dependent upon allowable base claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane M. Thomas whose telephone number is (571) 272-4188. The examiner can normally be reached M-F 8:30 - 5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt M. Kim can be reached at (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Shane M. Thomas



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